

**TSCA Section 403: Sampling Guidance for Identifying Lead-Based Paint  
Hazards**

**Public Review Draft**

**Office of Pollution Prevention and Toxics  
U.S. Environmental Protection Agency  
Washington, DC 20460**

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## Preface to the Public Review Draft

This guidance document is intended to provide advice to risk assessors on how to select, collect, and measure samples that can be compared to the lead-based paint hazard standards. This purpose of this draft is to obtain public comment on the substantive content of the document. The Agency will consider all comments when it finalizes this guidance document. As part of this process, the Agency will revise the text to make it more readable and reformat the document to make it easier to find information. EPA will issue final sampling guidance when it promulgates the final section 403 regulation.

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## **1.0 Risk Assessment Dust Sampling**

### **Synopsis**

This section describes how to conduct dust sampling so as to select, collect, and measure dust samples that are valid samples with lead levels that can be compared to the dust standards in 40 CFR 745.65(d).

### **Why Sample**

The purpose of dust sampling is to test dust in residential housing for high levels of lead. Lead in dust is thought to be the primary route by which children are exposed to lead in residential housing.

### **Who Should Select and Collect Samples**

Dust samples should be selected and collected by a certified risk assessor.

### **When to Sample**

The U.S. Environmental Protection Agency (EPA) recommends that dust sampling be conducted as part of a risk assessment as defined in 40 CFR 745.223. Risk assessments may be conducted at any time.

### **Where to Sample**

#### Single-family housing

Dust samples from uncarpeted floors and interior window sills should be collected in all living areas where one or more children, age six and under, are most likely to come into contact with dust. Examples of such living areas are play areas within rooms, high-traffic walkways, room midpoints, and areas underneath windows. Interior window sill dust samples in a given room should be collected from the window that is most frequently operated or most frequently contacted by children.

#### Multifamily housing

For multifamily housing, three approaches are possible to select dwelling units for sampling, provided that the dwelling units in question are similarly constructed and maintained. First, a random sample of units can be selected from all the units in the multifamily complex following the approach for dust clearance testing described in Section 4.0 below. Sample sizes for this approach are listed in Table 1. This approach would meet the performance specification in Section 4.0.

Two alternative approaches are described in 1995 U.S. Department of Housing and Urban Development (HUD) *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing*: targeted sampling and worst case sampling. Targeted sampling is based on records and interviews to select dwelling units according to the following criteria (which are listed in order of decreasing importance):

- dwellings cited with housing or building code violations in the last year;
- dwellings that the owner believes are in poor condition;
- dwellings that contain two or more children between the ages of six months and six years, with preference to the dwellings that contain the largest number of children;
- dwellings that serve as day-care facilities; and
- dwellings prepared for re-occupancy within the past three months.

Additional dwellings can be selected by a random procedure to bring the total to the sample size goals for targeted housing in the HUD Guidelines. Table 2 lists the samples sizes for a targeted sample of dwelling units as recommended by the HUD Guidelines.

Worst case sampling requires a walk-through survey of all dwellings by a risk assessor to determine, on the basis of direct visual evidence, which units should be selected. The highest risk dwellings should be selected for sampling, such as dwelling units cited for housing or building code violations or dwelling units in deteriorated condition. There are no specific sample sizes for worst case sampling.

Common areas adjacent to a sampled dwelling unit should be sampled. Other common areas where one or more children, age six and under, are likely to come into contact with dust should also be sampled.

Individual dwelling units and common areas should be sampled as a single-family house would be sampled.

## **How to Sample**

The wipe method is a recommended method for collecting dust samples on (uncarpeted) interior window sills. Wipe methods are not recommended for highly textured surfaces such as brickwork and rough concrete.

The recommended protocol for collecting wipe samples is described in Chapter C of the EPA report *Residential Sampling for Lead: Protocols for Dust and Soil Sampling*. Equivalent methods, such as the wipe sample protocol in Appendix 13.1 of the 1995 HUD *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing* or ASTM E 1728, Standard Practice for Field Collection of Settled Dust Samples Using Wipe Sampling Methods for Lead Determination by Atomic Spectrometry Techniques, may be used, provided carpets and

highly textured surfaces are not sampled. ASTM E 1792, Standard Specification for Wipe Sampling Materials for Lead in Surface Dust, may also be of interest.

Vacuum methods may be used. However, the user is required to determine an equivalent dust standard, as the EPA dust standards are expressed as wipe sample standards. The recommended protocol for vacuum collection is described in the U. S. EPA 1996 report ***Lead-Based Paint Abatement and Repair and Maintenance Study in Baltimore: Pre-Intervention Findings*** (EPA report number 747-R-95-012) or in the journal article by Farfel, MR, Bannon, D, Chisholm, JJ Jr, Lees, PSJ, Lim, B, and Rohde, CA entitled "Comparison of a wipe and vacuum collection method for the determination of lead in residential dusts" published in ***Environmental Research* 65:291-301.**

### **Composite Samples**

Samples collected may be composited (that is, combined) for laboratory analysis provided that samples for different components (i.e., floors and interior window sills) are combined in separate composites. The number of samples in a composite will increase the weight of the sample. EPA recommends that the laboratory that will do the chemical analysis be consulted to determine the appropriate number of samples that can be combined in one composite. All subsamples in a composite should be collected from approximately the same size area.

### **Laboratory Analysis**

Dust samples should be analyzed by a laboratory recognized by EPA pursuant to Section 405(b) of the Toxic Substances Control Act (TSCA) as being capable of performing analyses for lead compounds in dust samples. A list of such laboratories can be obtained by calling the Lead Clearinghouse at 1-800-424-LEAD and requesting the NLLAP (National Lead Laboratory Accreditation Program) list of laboratories.

## **2.0 Risk Assessment Paint Sampling**

### **Synopsis**

This section describes how to conduct paint sampling so as to select, collect, and measure paint samples that are valid samples that can be compared to the paint standards in 40 CFR 745.65(a).

### **Why Sample**

The purpose of paint sampling is to test all deteriorated painted surfaces and all accessible painted surfaces. Deteriorated painted surfaces have been linked to high levels of lead in dust and soil. Accessible surfaces are defined as painted interior window sills.

### **Who Should Select and Collect Samples**

Paint samples should be selected and collected by a certified risk assessor.

### **When to Sample**

EPA recommends that paint sampling be conducted as part of a risk assessment as defined in 40 CFR 745.223. Risk assessments may be conducted at any time.

### **Where to Sample**

#### Single-family housing

For a single-family dwelling, a visual inspection shall be undertaken to locate the existence of deteriorated paint on the interior and on the exterior of the property associated with the dwelling unit. Each surface with deteriorated paint that has a distinct painting history is to be tested. Accessible surfaces are defined as painted interior window sills. Each painted interior window sill that has a distinct painting history is to be tested.

#### Multifamily housing

For multifamily housing, three approaches are possible to select dwelling units for sampling, provided the dwelling units are similarly constructed and maintained. First, a random sample of units can be selected from all the units in the multifamily complex following the approach described for dust clearance testing in Section 4.0 below. This approach would meet the performance specification in Section 4.0. Table 1 lists the sample sizes for this approach.

Two alternative approaches are described in 1995 HUD *Guidelines for the Evaluation*

***and Control of Lead-Based Paint Hazards in Housing:*** targeted sampling and worst case sampling. Targeted sampling is based on records and interviews to select dwelling units according to the following criteria (which are listed in order of decreasing importance):

- dwellings cited with housing or building code violations in the last year;
- dwellings that the owner believes are in poor condition;
- dwellings that contain two or more children between the ages of six months and six years, with preference to the dwellings that contain the largest number of children;
- dwellings that serve as day-care facilities; and
- dwellings prepared for re-occupancy within the past three months.

Additional dwellings can be selected by a random procedure to bring the total to the sample size goals for targeted housing in the HUD Guidelines. Table 2 lists the samples sizes for the targeted sample of dwellings as recommended by the HUD Guidelines.

Worst case sampling requires a walk-through survey of all dwellings by a risk assessor to determine, on the basis of direct visual evidence, which units should be selected. The highest risk dwellings should be selected for sampling, such as dwelling units cited for housing or building code violations or dwelling units in deteriorated condition. There are no specific sample sizes for worst case sampling.

Common areas adjacent to a sampled dwelling unit should be sampled. Other common areas where one or more children, age six and under, are likely to come into contact with deteriorated painted surfaces or accessible surfaces should also be sampled.

Individual dwelling units and common areas should be sampled as a single-family house would be sampled.

## **How to Sample**

In general, there are two ways to sample paint: collection of a paint chip sample followed by laboratory analysis or an *in situ* measurement of a location on a painted component by a portable XRF instrument. Portable XRF is most practical on intact painted surfaces; paint chip sampling may be necessary on a deteriorated or a curved surface because of limitations of the XRF instruments on such surfaces.

A representative area on each component to be tested should be identified. This should be neither the thickest nor the thinnest spot on the component, but one that is characteristic of the overall thickness of the component. It is acceptable to select a non-deteriorated area or non-curved area on the component for sampling, as long as the available evidence and information indicates that the non-deteriorated or non-curved portion has the same painting history as the deteriorated or curved portion.



If paint chip samples are collected for laboratory analysis, a standard protocol for collecting paint chip samples should be followed. Examples of such protocols are ASTM E 1729, Standard Practice for Field Collection of Dried Paint Samples for Lead Determination by Atomic Spectrometry Techniques, and the paint chip collection protocol in Appendix 13.2 of the 1995 HUD Guidelines. ASTM E 1645, Standard Practice for the Preparation of Dried Paint Samples for Subsequent Lead Analysis by Atomic Spectrometry, is a related standard that may also be consulted regarding the preparation of paint chip samples for laboratory analysis. Care should be taken to collect all layers of paint in the area selected and to obtain a sufficient size sample for the anticipated chemical analysis method.

The results may be reported in either milligrams of lead per square centimeter or in micrograms of lead per gram or both. If results are reported in milligrams per square centimeter, sampling must be done with a demarcated area, and all paint within that area needs to be collected. If results are reported in micrograms per gram, inclusion of the material underneath the paint must be minimized. Results in milligrams per square centimeter are usually not affected by the inclusion of the material underneath the paint. Results in micrograms per gram are lower than would otherwise be the case when the material underneath the paint is included in the sample.

If an *in situ* measurement is made with a portable XRF instrument, the instrument should be operated in accordance with the procedures in the HUD Guidelines and with the procedures in the EPA/HUD Performance Characteristic Sheets (or equivalents to the Performance Characteristic Sheets). Substrate correction should be implemented when recommended. A paint chip sample should be collected for laboratory analysis in cases where the XRF reading would be suspect due to deterioration of the painted surface or curvature of the surface. A paint chip sample is necessary when the XRF result is inconclusive, as defined by the Performance Characteristic Sheets or their equivalents. XRF results are reported in milligrams per square centimeter.

### **Composite Samples**

Paint chip samples may be composited (that is combined) to reduce the cost of chemical analysis. The number of samples in the composite will increase the weight of the sample. EPA recommends that the laboratory that will do the chemical analysis be consulted to determine the appropriate number of samples that can be combined in one composite. Composite sample results can be expressed in milligrams per square centimeter or micrograms per gram. To report the results in milligrams per square centimeter, all the sub-samples in the composite should have been collected from approximately the same size surface area. To report the results in micrograms per gram, all the sub-samples in the composite should be of approximately the same mass. As a practical matter, it is easier to maintain a constant surface area than equal mass for different paint samples.

### **Portable XRF Analysis**

If a portable XRF instrument is used to measure lead in paint, then, as stated above, the instrument should be used as recommended in the 1995 HUD Guidelines and supplementary information in the XRF Performance Characteristic Sheets released by HUD and EPA and available from the National Lead Information Center by calling 1-800-424-LEAD, or an equivalent to the XRF Performance Characteristic Sheets. The most current Performance Characteristic Sheets (or their equivalents) should be used for testing guidance and interpreting results.

### **Laboratory Analysis**

Paint chip samples that are analyzed by chemical analysis should be analyzed by a laboratory recognized by EPA pursuant to Section 405(b) of TSCA as being capable of performing analyses for lead compounds in paint samples. A list of such laboratories can be obtained by calling the Lead Clearinghouse at 1-800-424-LEAD and requesting the NLLAP (National Lead Laboratory Accreditation Program) list of laboratories.

### **3.0 Risk Assessment Soil Sampling**

#### **Synopsis**

This section describes how to conduct soil sampling so as to select, collect, and measure soil samples that are valid samples with lead levels that can be compared to the soil standard in 40 CFR 745.65(c).

#### **Why Sample**

The purpose of soil sampling is to test soil in residential housing for high levels of lead. Lead in soil is thought to be a pathway by which lead, originally from lead-based paint, the past use of lead in gasoline, and other sources, reaches children,. Lead in soil can be directly ingested through normal hand-to-mouth behavior; it can also contribute to the contamination of household dust.

#### **Who Should Select and Collect Samples**

Soil samples should be selected and collected by a certified risk assessor.

#### **When to Sample**

EPA recommends that soil sampling be conducted as part of a risk assessment as defined in 40 CFR 745.223. Risk assessments may be conducted at any time.

#### **Where to Sample**

##### Single-family housing

Soil samples should be collected from the following areas:

- 1) dripline/foundation areas where bare soil is present; and
- 2) areas near the middle of yard around the house where bare soil is present.

Dripline/foundation areas are by definition within 3 feet of the house. If there is no bare soil within 3 feet of the house, sample the bare soil nearest to the house as the “dripline” sample. The middle of the yard is the area on each side of the house approximately halfway between the foundation of the house and the property boundary. If the risk assessor can identify a play area (i.e., areas identified by parents or care givers where children spend most of their outdoor playtime, such as the location of play equipment) in the middle of the yard, the mid-yard sample should be taken from this area. If there is no bare soil in the middle of the yard, sample the nearest bare soil to the middle of the yard as the “mid-yard” sample. While only bare soil in

these areas needs to be sampled, EPA recommends that covered soil be sampled if the risk assessor has reason to believe that a soil lead hazard is present. Indicators of hazard include the presence of children with elevated blood-lead levels in the community, high soil-lead levels in neighboring yards, the presence of nearby industrial sources, and the presence of a nearby steel structure such as a bridge or a highway overpass.

The easiest and most cost-effective way to sample soil is to collect field composite samples. A field composite sample consists of individual sub-samples collected from two or more locations and combined into a single sample for analysis. At least two composite samples should be collected: one for the bare dripline/foundation area and one for the bare mid-yard areas. Other composite samples may be collected for additional sites that are sampled. No more than 10 sub-samples should be combined into one composite sample. More than 10 sub-samples may add extra laboratory costs without much gain in representativeness.

The determination of sub-sample locations may be done by either option A or option B described below.

**Option A.** Sub-sampling locations for bare mid-yard areas are selected by first sketching the area and then drawing a circle just encompassing the accessible bare area. A second circle is drawn inside the first with one-half the radius. Three equally spaced sampling locations are selected at random on the inner circle. Soil sub-samples are then collected at each location. This process may be repeated for up to three mid-yard areas, if present.

To sample the bare areas of dripline/foundation, take four individual sub-samples. Where possible, given the accessibility limitations and the availability of bare soil, each sub-sample should be located at random in a bare soil area at the dripline/foundation on a different side of the house. Combine the four individual sub-samples into one composite sample.

At additional sites for sampling, follow the procedures for play or mid-yard samples.

**Option B.** Each composite sample should consist of bare area soil sub-samples collected from three to 10 distinct locations roughly equidistant from each other along an axis. For samples collected along the dripline/foundation, sub-samples should be collected at least 2 to 6 feet away from each other. At other sampling locations, samples should be collected at roughly equidistant points along each axis of an "X" shaped grid.

This option can be used for sampling additional soil sites.

### Multifamily housing

Regard each separate building in a multifamily housing development as a single-family house. Follow the same procedures as for single-family housing.

### **How to Sample**

Soil sub-samples may be collected using either a coring method or a scoop method. A coring method would not be appropriate for sandy, dry, or friable soil. In these cases, a scooping method would be necessary. Recommended protocols for collection of soil sub-samples are presented in Chapter B of the EPA report *Residential Sampling for Lead: Protocols for Dust and Soil Sampling*. These protocols call for collection of the top half inch of soil. If paint chips are collected in the soil sub-sample, they should be included as part of the soil matrix. However, there should be no attempt to over sample paint chips.

Equivalent protocols, such as the soil sample protocol in the Appendix 13.3 of the 1995 HUD *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing* or ASTM E 1727, Standard Practice for Field Collection of Soil Samples for Lead Determination by Atomic Spectrometry Techniques, may also be used. The top half inch of soil is to be collected when using these protocols.

### **Composite Samples**

As described above, compositing of soil sub-samples for laboratory analysis is the recommended approach for soil sampling. Combining soil samples usually does not present the same level of difficulties associated with combining dust or paint samples. This is because composited soil samples can be readily dried, sieved, homogenized, and then subsampled before chemical analysis. Nevertheless, it is recommended that the laboratory that will do the chemical analysis be consulted to make sure the samples submitted for chemical analysis can be analyzed without any problems. Soil sub-samples in a composite should be approximately the same mass.

### **Laboratory Analysis**

Soil samples should be analyzed by a laboratory recognized by EPA pursuant to Section 405(b) of TSCA as being capable of performing analyses for lead compounds in soil. A list of such laboratories can be obtained by calling the Lead Clearinghouse at 1-800-424-LEAD and requesting the NLLAP (National Lead Laboratory Accreditation Program) list of laboratories.

## **4.0 Dust Clearance Sampling**

### **Synopsis**

This section describes how to conduct dust clearance sampling so as to select, collect, and measure dust clearance samples that are valid samples with lead levels that can be compared to the clearance standards in 40 CFR 745.227.

### **Why Sample**

The purpose of dust clearance testing is to ascertain that the interior of a residence or common area in a building has been cleaned to the point that normal occupancy can be resumed. Dust clearance testing is expected to be conducted after abatement (as defined in 40 CFR 745.223) is performed, but can also be conducted after application of interim controls. 40 CFR 745.227 requires dust clearance testing if abatement work is performed by a lead professional.

### **Who Should Select and Collect Samples**

Dust clearance samples should be selected and collected by a certified risk assessor or by a certified inspector. It is recommended that the dust clearance testing be conducted by a firm or by individuals that are independent of the firm or individuals who conducted the abatement or applied the lead hazard controls. In any case, the persons responsible for abatement or cleaning should not know the location of the dust clearance samples.

### **When To Sample**

Dust clearance testing should not begin until after a visual inspection determines that all abatement or lead hazard control work has been completed, all finishing coatings and sealants have been applied, and there is no visible dust or debris in the residence or common area. In the case of abatement, 40 CFR 745.227 requires that dust clearance samples be taken at least one hour after the completion of final post-abatement cleanup activities to allow for settling of suspended dust.

### **Where to Sample**

#### Single-family housing

#### Containment between abated and unabated areas

40 CFR 745.227 (as amended by the Section 403 regulation), requires collection of dust samples from at least four rooms, hallways, or stairways within the containment area. Within each room, hallway, or stairway, one dust sample is to be taken from the floor, one dust sample

is to be taken from an interior window sill (if present), and one sample is to be taken from a window trough (if present). If there are fewer than four rooms, hallways, or stairways within the containment area, then all rooms, hallways, and stairways are to be sampled. In addition, one sample is to be taken from the floor outside the containment area.

Dust samples can be taken from either 1) specific locations near the area where the lead abatement or hazard control was done or 2) nearby high traffic areas such as around doorways. The type of abatement or hazard control, visual observation, or professional judgment may be used to determine the specific area for sampling. If none of these approaches provides a way to select areas for sampling, areas for sampling can be selected randomly. For example, if there are more than four rooms, hallways, and stairways, a sample of these may be selected randomly. Random selection may also be used to select which interior window sill to sample (if there is more than one present in a room), which window trough to sample (if there is more than one present in a room), and the specific location on the floor for sampling.

The floor sample taken outside the containment area should be taken within 10 feet of the airlock.

#### No containment between abated and unabated areas

If there is no containment within a residence, 40 CFR 745.227 (as amended by the section 403 regulation), requires collection of dust samples from at least four rooms, hallways, or stairways in the residence. Within each room, hallway, or stairway, one dust sample is to be taken from the floor and one dust sample is to be taken from the interior window sill. If there are fewer than four rooms, hallways, or stairways in the residence, then all rooms, hallways, and stairways are to be sampled.

Dust samples can be taken from either 1) specific locations near the area where the lead abatement or hazard control was done or 2) nearby high traffic areas such as around doorways. The type of abatement or hazard control, visual observation, or professional judgment may be used to determine the specific area for sampling. If none of these approaches provides a way to select areas for sampling, areas for sampling can be selected randomly. As in the case with containment, random selection may be used to select rooms, hallways, and stairways; interior window sills; window troughs; and locations on floors for sampling when other approaches do not identify areas for sampling.

#### Multifamily housing

For multifamily housing, clearance testing may be conducted in all dwelling units that have been treated or, provided the dwelling units are similarly constructed and maintained (in this context “maintained” means abated and cleaned), in a sample of the treated dwelling units. If sampling is carried out, 40 CFR 745.227 requires that a sufficient number of residential

dwelling be selected to provide a 95% level of confidence that no more than 5% or 50 of the residential dwellings (whichever is smaller) in the randomly sampled population exceed the appropriate clearance levels. Table 1 lists sample sizes that meet this criterion for a randomly selected sample. 40 CFR 745.227 also requires that the persons who abate or clean the residential dwellings do not know which residential units will be selected for the random sample.

If common areas in multifamily housing were abated, then either all the abated common areas should be sampled for clearance or similarly constructed and maintained common areas can be randomly sampled as if they were residential dwelling units following the procedures for dwelling units. If there was containment in a common area, then one floor sample should be taken outside the containment area, within 10 feet of the airlock.

Each dwelling unit or common area should be sampled following the procedures above for single-family housing, with one exception. In common areas, there should be one floor sample for every 2000 square feet of area.

## **How to Sample**

The wipe method is a recommended method for collecting dust samples on uncarpeted floors and on (uncarpeted) interior window sills and window troughs. Wipe methods are not recommended for highly textured surfaces such as brickwork and rough concrete. Selection of additional rooms, hallways, or stairways with alternate floor areas and/or windows for sampling should be carried out if carpeted or highly textured surfaces are present in the originally selected rooms, hallways, or stairways.

The recommended protocol for collection of wipe samples is that in Chapter C of the EPA report ***Residential Sampling for Lead: Protocols for Dust and Soil Sampling***. Equivalent methods, such as the wipe sample protocol in Appendix 13.1 of 1995 HUD ***Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing*** or in ASTM E 1728, Standard Practice for Field Collection of Settled Dust Samples Using Wipe Sampling Methods for Lead Determination by Atomic Spectrometry Techniques, may be used, provided carpets and highly textured surfaces are not sampled. ASTM E 1792, Standard Specification for Wipe Sampling Materials for Lead in Surface Dust, may also be consulted.

Vacuum methods may be used. However, the user is required to determine an equivalent clearance standard, as the EPA clearance standards are expressed as wipe sample standards. The recommended protocol for vacuum collection is described in the U. S. EPA 1996 report ***Lead-Based Paint Abatement and Repair and Maintenance Study in Baltimore: Pre-Intervention Findings*** (EPA report number 747-R-95-012) or in the journal article by Farfel, MR, Bannon, D, Chisholm, JJ Jr, Lees, PSJ, Lim, B, and Rohde, CA entitled "Comparison of a wipe and vacuum collection method for the determination of lead in residential dusts" published in ***Environmental Research* 65:291-301**.



### **Composite Samples**

Samples collected may be composited (that is, combined) for laboratory analysis provided that samples for different components (i.e., floors, interior window sills, and window troughs) are combined in separate composites. The number of samples in a composite will increase the weight of the sample. EPA recommends that the laboratory that will do the chemical analysis be consulted to determine the appropriate number of samples that can be combined in one composite. All sub-samples in a composite should be collected from approximately the same size area.

### **Laboratory analysis**

The work practice standards found at 40 CFR 745.227 require that clearance samples be analyzed by a laboratory recognized by EPA pursuant to Section 405(b) of TSCA as being capable of performing analyses for lead compounds in dust samples. A list of such laboratories can be obtained by calling the Lead Clearinghouse at 1-800-424-LEAD and requesting the NLLAP (National Lead Laboratory Accreditation Program) list of laboratories.

## 5.0 References

1. U. S. Environmental Protection Agency, Office of Prevention, Pesticides, and Toxic Substances. *Residential Sampling for Lead: Protocols for Dust and Soil Sampling*, EPA 747-R-95-001, March 1995.
2. U.S. Department of Housing and Urban Development, Office of Lead-Based Paint Abatement and Poisoning Prevention (now the Office of Lead Hazard Control). *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing*, HUD-1539-LBP, July 1995.
3. American Society for Testing and Materials. *Standard Practice for Field Collection of Settled Dust Samples Using Wipe Sampling Methods for Lead Determination by Atomic Spectrometry Techniques*, ASTM E 1728.
4. American Society for Testing and Materials. *Standard Specification for Wipe Sampling Materials for Lead in Surface Dust*, ASTM E 1792.
5. U.S. Environmental Protection Agency, Office of Prevention, Pesticides, and Toxic Substances. *Lead-Based Paint Abatement and Repair and Maintenance Study in Baltimore: Pre-Intervention Findings*, EPA 747-R-95-012, August 1996.
6. Farfel, M.R., D. Bannon, J.J. Chishom Jr., P.S.J. Lees, B. Lim, and C.A. Rohde. "Comparison Of A Wipe And Vacuum Collection Method For The Determination Of Lead In Residential Dusts," *Environmental Research*, 65:291-301.
7. American Society for Testing and Materials. *Standard Practice for Field Collection of Dried Paint Samples for Lead Determination by Atomic Spectrometry Techniques*, ASTM E 1729.
8. American Society for Testing and Materials. *Standard Practice for the Preparation of Dried Paint Samples for Subsequent Lead Analysis by Atomic Spectrometry*, ASTM E 1645.
9. American Society for Testing and Materials. *Standard Practice for Field Collection of Soil Samples for Lead Determination by Atomic Spectrometry Techniques*, ASTM E 1727.
10. U.S. Environmental Protection Agency, Office of Prevention, Pesticides, and Toxic Substances. *Methodology for XRF Performance Characteristic Sheets*, EPA 747-R-95-008, September 1997.

**Table 1: Number of Units to Be Tested in Multifamily Housing Using Random Selection Approach**

Number of Units Similarly Constructed and Maintained	Number of Units to be Tested
21-26	20
27	21
28	22
29-30	23
31	24
32	25
33-34	26
35	27
36	28
37	29
38-39	30
40-50	31
51	32
52-53	33
54	34
55-56	35
57-58	36
59	37
60-73	38
74-75	39
76-77	40
78-79	41
80-95	42
96-97	43
98-99	44
100-117	45
118-119	46
120-138	47
139-157	48
158-177	49
178-197	50
198-218	51
219-258	52
259-299	53
300-379	54
380-499	55
500-776	56
777-1004	57
1005-1022	58
1023-1039	59

For cases of 1040 units or more, test 5.8 percent of the number of units, rounded to the nearest unit. EXAMPLE:  
If there are 2,170 units, 5.8 percent is 125.86, so 126 units should be tested.

**Table 2. Minimum Number Of Units To Be Tested In Multifamily Housing Using**

**Targeted Sampling**

Number of Units Similarly Constructed and Maintained	Number of Dwellings to Sample
1-4	All
5-20	4 units or 50%, whichever is greater
21-75	10 units or 20%, whichever is greater
76-125	17
126-175	19
176-225	20
226-300	21
301-400	22
401-500	23
501+	24+1 dwelling for each additional increment of 100 dwellings or less